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FAA Configuration Management Program Plan

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EXECUTIVE SUMMARY

BACKGROUND

Configuration management is a well-understood and well-defined discipline in both industry and government. Its primary functions (configuration identification, change control, status accounting and auditing) have not changed substantially over the years, but the environment CM supports has changed significantly. These environmental changes lead to three key problem areas for FAA CM:

- Lack of a central CM authority, policy, and information management
- Inaccurate and inadequate baselines and
- Lack of support for the overall CM system

These problem areas could not be resolved by any single organization and as such, a CM Steering Group (CMSG) was formed and chartered to guide the development, implementation and operation of CM for the National Airspace System (NAS). The CMSG functions in concert with the CM Authority (currently ACM-1) to establish and promote an integrated CM discipline that support the FAA mission. Additionally, the Configuration Management Core Team (CMCT) was established by the CMSG to lead their process improvement initiatives.

At the completion of the process improvement initiatives (detailed in this plan), the FAA CM vision will be realized, as there will be a group of dedicated CM Practitioners, who will be executing an integrated FAA CM discipline that has the following characteristics:

- *supports planning, life cycle management and decision making for FAA systems;*
- *satisfies stakeholder needs with accurate, current information throughout the NAS life cycle;*
- *ensures subsystem traceability to the NAS architecture;*
- *results in reduction in the cost of developing, deploying, operating and maintaining ATC systems and FAA facilities; and*
- *is consistent with evolving FAA business practices.*

SUMMARY OF THE PLAN

This FAA CM Program Plan (CMPP) provides an agreement between the CMSG and the agency outlining the enhancement activities to be performed to achieve the FAA CM vision. The plan outlines the activities required to achieve the vision in the following focus areas:

- A strong organization responsible for CM, reporting to ATS and ARA;
- A consistent and balanced application of process and policy;
- A skilled workforce and technology to effectively perform CM; and
- A commitment from Associates and all levels of the organization.

These focus areas assume that the CMSG is promoting a single, agency CM approach, integral to operations, maintenance and acquisition.

The plan provides detailed activities for a twelve month period with a list of more general high level activities to be performed into the year 2003. The plan will be updated annually at minimum to capture changes in planned activities.

GETTING WELL

The initial emphasis is on implementing the infrastructure, people, process(s) and technology to operate FAA CM at an optimal level.

Key activities include:

- Ensuring that agency CM is accountable to both ATS and ARA

- Ensuring Life cycle CM Policy is implementable via a set of National Procedures
- Providing a common view of the NAS to all decision makers
- Providing a means to measure the effectiveness of agency CM
- Providing a means to build and retain a skilled CM workforce
- Developing and implementing an agency CM information architecture

OPERATIONS USING THE ENHANCED CM DISCIPLINE

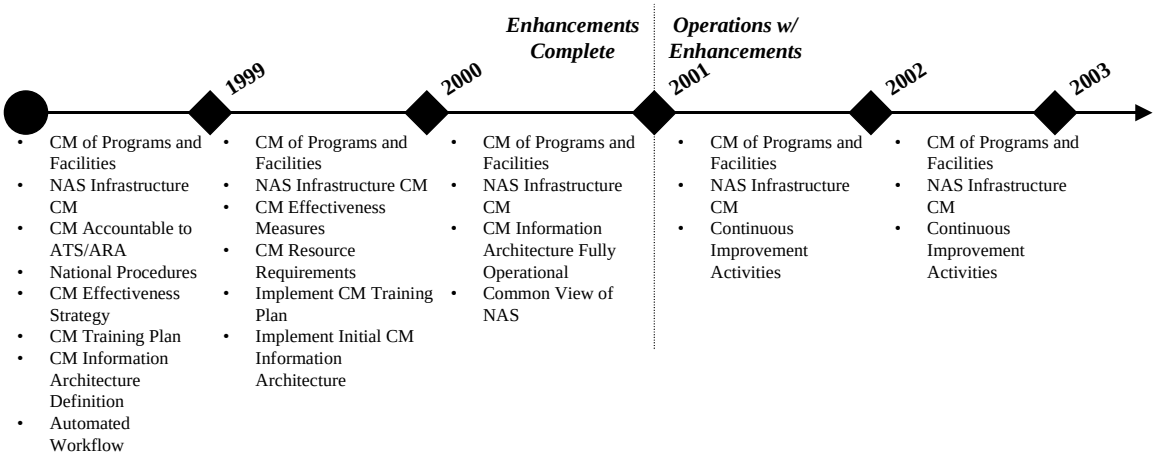
The enhanced CM discipline will provide managers, engineers, technicians and CM practitioners a uniform, streamlined corporate process with capabilities to access and share information easily and make informed decisions in an efficient manner.

Operating under the enhanced CM discipline will produce these results:

- A consistent agency-wide change control process
- A life cycle CM process which integrates with related processes (JRC, logistics, 2nd level maintenance, etc.)
- Full impact analysis of changes (requirements through fielded systems)
- On-line access to accurate information (specifications, change notices, modification status, site configuration data, etc.)
- Dedicated and trained resources
- Documented continuous improvement

FIVE YEAR TIMELINE (CALENDAR YEARS)

The key activities are plotted on a five year timeline



REQUIRED RESOURCES

The National CM Process sets forth the CM activities that need to be performed to ensure that "CM is done right". Using that model and the extrapolations from the resource survey, to perform day-to-day CM of Programs and Facilities requires 123 resources and to perform day-to-day NAS Infrastructure CM requires 24 resources (147 total). Based on current agency CM practitioners and our current model for doing business, we are 45% understaffed. The resource activities defined within the CMPP provide a longer term, more detailed activity to identify, validate, efficiencies in applying CM for the agency.

Moreover, to complete the enhancement activities discussed in section 3 of the CM Program Plan, while maintaining the staff to “Do CM Right” would require an additional 11 resources in 1999, 8 resources in 2000, and 5 resources in 2001.

1 Introduction

1.1 Background

CM is an important discipline in the FAA. It has always been applied during the operational phase for its maintenance and modification of equipment. In the 1970's, CM was instituted in the procurement and maintenance of the IBM 9020's and the Central Display Channel mainframes. Since then, the National Airspace System (NAS) Modernization plans have required implementation of CM over the life cycle of the entire NAS.

Configuration management is a well-understood and well-defined discipline in both industry and government. Its primary functions (configuration identification, change control, status accounting and auditing) have not changed substantially over the years, but the environment CM supports has changed significantly. These environmental changes lead to three key problem areas for FAA CM:

- Lack of a central CM authority, policy, and information management system
- Inaccurate and inadequate baselines
- Lack of support for the overall CM system

These problem areas could not be resolved by any single organization and as such, a CM Steering Group (CMSG) comprised of Agency Senior Executives, was formed and chartered to guide the development, implementation and operation of CM for the NAS. The CMSG functions in concert with the CM Authority (ACM-1) to establish and promote an integrated CM discipline that supports the FAA mission. Additionally, the CM Core Team (CMCT) was established by the CMSG to lead CM process improvement initiatives. At the completion of these process improvement initiatives, it is envisioned that the FAA CM system will be performed by a group of dedicated CM Practitioners, who will be executing an integrated FAA CM discipline that has the following characteristics:

- *supports planning, life cycle management and decision making for FAA systems;*
- *satisfies stakeholder needs with accurate, current information throughout the NAS life cycle;*
- *ensures subsystem traceability to the NAS architecture;*
- *results in reduction in the cost of developing, deploying, operating and maintaining ATC systems and FAA facilities; and*
- *is consistent with evolving FAA business practices.*

Successful implementation of the process improvement initiatives which support the achievement of this vision facilitates meeting the following 1999 ATS and ARA goals and outcomes:

- ***ATS***
  - **OUTCOME #6**: Improve Service Delivery by Increasing the Availability of Critical Systems
  - **OUTCOME #7**: Increase Productivity
- ***ARA***
  - **GOAL #7**: Acquisition Cost and Schedule
  - **GOAL #10**: FAA iCMM

In order to make the FAA CM vision a reality there must be a single, agency CM approach, that is integral to operations, maintenance and acquisition. The successful development and implementation of this single, agency CM approach hinges upon the realization of the following CM initiatives:

- Establish and operate a strong CM organization, reporting to ATS and ARA;
- Perform a consistent and balanced application of process and policy;
- Develop a skilled workforce and technology to effectively perform CM; and

- Obtain commitment from Associates and all levels of the organization.

1.2 Purpose

The purpose of this document is to outline the process improvement initiatives and the associated enhancement activities that must be performed in order to achieve the FAA CM vision. The document provides the timeframes for completion of these activities and provides an estimate of the resources required to complete them. The document represents an agreement by the CMSG that these are the activities that must be performed and that the necessary resources are available and dedicated.

1.3 Scope

This plan outlines the recurring tasks executed in the performance of FAA CM, as well as those enhancement activities required to develop a single, agency CM approach, integral to operations, maintenance and acquisition.

The activities identified in this plan and the associated outcomes, are not intended to supercede or modify the Federal Aviation Regulations and other orders or regulations that govern the configuration management of aircraft.

It does not include a description of the day-to-day recurring CM tasks as these are described in the individual IPPs, CM Plans, etc.; however, an overview of the general types of activities and the resources required to perform these activities are included in section 2 of this plan.

1.4 Plan Organization

There are four sections of this plan:

- **Introduction (Section 1)** - Provides background information, scope, management of the plan, implementation overview and success measures.
- **Recurring CM Activities (Section 2)** – Provides an overview of the CM activities performed by current FAA CM resources in support of system acquisition, deployment, operations, and decommissioning.
- **Enhancement CM Activities (Section 3)** – Provides an overview of the enhancement activities to be performed in support of current CMSG direction.
- **Resources and Risks (Section 4)** – Provides an overview of required resources to develop and implement the enhancement activities and potential
- **Appendices** – Provides a detailed breakout of the activities to be performed by WBS element and organization; also includes an acronym list for the CMPP

1.5 Management of Plan

The plan represents the tasks to be accomplished by the CM community. Its sponsored by the CMSG, approved by ATS/ARA-1, and developed by the CMCT. The CM Authority (ACM-1) will update the plan at a minimum, annually, to capture the changes in the planned activity.

1.6 *Implementation Approach for the Enhancement CM Activities (of Section 3)*

The work identified in this plan provides the infrastructure to support the agency in achieving their strategic goals within established timeframes. The planned CM activities fully support all iCMM level 2 (Repeatable: Planned and Tracked) requirements.

Our implementation approach builds on the completed Policy and Process work. The primary focus is on development of National CM Procedures that form the foundation by which standardization and consistency of CM processes and products can be performed and measured. The initial steps in 1999 to strengthen the CM organization, along with technology enhancements (emphasis on the change management process activities), will serve as enablers to the implementation of National Procedures.

Cross functional teams (similar to those used to develop the policy and process) will contribute to the development of the procedures and support the requirements for the technology enhancements. The CM Core Team will continue to guide this development and integrate work products for presentation to the CMSG.

Further efforts in identifying and securing adequate resources, design of the overall information architecture and intensified education and training will ensure that the overall CM process and its application to individual programs and organizations is iCMM level 3 compliant.

1.7 Measuring Success

Measuring the success of the enhancements described in this plan is a two-part activity. The initial success measures focus on the implementation of this plan. The initial success measures are:

- Approval of this plan by Sept 30, 1999; and
- Ensure existing resources available to support the activities outlined in this plan.

Once the tasking of this plan has been completed, success can be measured in terms of measurable improvements (quantity and quality) in the CM system. Specific effectiveness measures will be developed by the CMCT (section 3.2.2); however, ***sample*** CM measures are listed below to provide insight into the types of measures that could be collected:

[1]*CM Practitioners working in accordance with approved policy, process and procedures*

- Percentage of Documented OPI Procedures/Variances Identified
- Acquisitions resulting in operationally suitable CM and CM related deliverables (standardized contract language)
- Reduced Time/Cost to Implement/Transition to Operations
- Percentage of Baselines (systems & facilities) established and maintained
- Percentage of changes processed without rework (quality casefiles/NCPs)
- Percentage of approved changes which can be traced to the technical architecture, to the implementing vehicle (EEM, SPB, etc.), and implementation verified

Trained CM Practitioners and Management Support

- Percentage of CM Practitioners who have completed awareness, basic and advanced training (see Section 3.3.1)
- CM included in performance plans of all LOB represented on the CMSG

Accurate CM information accessible

- Percentage of [2]CM documentation available online
- Percentage of CM documentation online and accessible by the LOBs represented on the CMSG

[1] CM Practitioners defined as those listed on the FAA CM Point-of-Contact Listing

[2] Table 3.3.2 Describes a document management strategy/CONOPs which will define "CM Documentation"

2 Recurring CM Activities

This section addresses the CM activities performed by current FAA CM resources in support of system acquisition, deployment, operations, and decommissioning. In the FAA there are two segments to this work:

1. ***CM of Programs and Facilities***: IPTs, Solution Providers, AF, and Regional offices performing CM.
2. ***NAS Infrastructure CM***: ACM, augmented by the CMSG, CMCT and cross-functional working groups.

The lack of an effective CM culture within the FAA has resulted in an inconsistent performance of CM. Although there are pockets of excellence within the FAA, overall, CM is not being performed at an acceptable level, which has caused a lack of integrity of the baseline information and major degradation to the "agency" CM process. Upon successful implementation of the enhancement activities (section 3), our agency will execute CM as described below.

2.1 CM of Programs and Facilities

The activities associated with the CM of Programs and Facilities includes:

Plan and Manage CM: The work associated with planning and management focuses on the effective implementation of CM over the life cycle of each NAS product. It provides rules, guidance and methods for CM process standardization and consistency and process evaluation. Planning and management supports integrated, consistent, rule based, flexible, and measured processes.

Configuration Identification: The purpose of configuration identification is to incrementally establish and maintain a definitive basis for control and status accounting for a configuration item (CI) throughout its life cycle. It includes the selection of CIs; the determination of the types of configuration documentation required for each CI; the issuance of numbers and other identifiers affixed to the CIs and to the technical documentation that defines the CI's configuration, including internal and external interfaces; the release of CIs and their associated configuration documentation; and the establishment of configuration baselines for CIs.

Change Management: The primary purpose of this activity is to provide change control of the technical baselines produced in the established baseline configurations. This includes the identification of a requirement, how this requirement will be met, and implementation of approved changes. The type of information and products generated during the Change Management activity are:

- Change decision data,
- Approved changes and associated data, and
- Implementation milestone data

Configuration Status Accounting (CSA): Configuration Status Accounting (CSA) is the formalized process of the record keeping activity used in CM and the information system or database that must exist to provide all of the necessary information. To accomplish the CSA function, a record of the documentation defining each major hardware/software and facility item must be established and maintained. Through CSA, baselined documentation is managed and traced through listings, drawings, and specifications from their current status back to the original baseline status. Any specific product should be traceable from its current configuration back to its original baseline configuration. The CSA system must provide the complete database or information system to assure that the effects of any change are recorded for future reference; it must also include links to Logistics information (databases). CSA is the cornerstone of change management. Use of automated tools to manage the CSA data enables CM to effectively manage the "as designed" and "as built/as maintained" activity within each product or program.

Configuration Verification and Audit: The configuration verification and audit process includes:

- Configuration verification of the initial configuration of a CI, and the incorporation of approved engineering changes, to assure that the CI meets its required performance and documented configuration requirements
- Configuration audits provide the framework, and the detailed requirements, for verifying that the development effort has successfully achieved all of the specified requirements.
    1. Functional Configuration Audit (FCA). The FCA is conducted to determine whether or not the actual performance of each CI complies with its controlling specifications. Specifically, an FCA must verify that the functional, allocated, design (if applicable), and proposed product baselines are consistent and that functional requirements are traceable, as shown through the documentation and test results.
    2. Physical Configuration Audit (PCA). The PCA is a formal examination of CI's to ensure that each complies with the technical documentation. It verifies "as-built" configuration conformity with the product configuration identification and document traceability. Successful completion of the PCA is a prerequisite to establishment of the product baseline.

The common objective is to establish a high level of confidence in the configuration documentation used as the basis for configuration control and support of the product throughout its life cycle.

Table 2.1-1: CM of Programs and Facilities

Activity	Supporting Organizations
Plan and Manage CM Activities	AML, AND, ANI, AOP, AOS, AUA, ANS, Regions
Perform Configuration Identification	AML, AND, AOP, AOS, AUA, ANS, Regions
Perform Change Management	AML, AND, ANI, AOP, AOS, AUA, ANS, Regions
Perform Configuration Status Accounting	AML, AND, AOP, AOS, AUA, ANS, Regions
Perform Verification and Audits	AML, AND, AOP, AOS, AUA, ANS, Regions

2.2 NAS Infrastructure CM

NAS Infrastructure CM is defined by the activities required to maintain the overall integrity of the CM process, maintain the NAS level baselines, provide visibility and traceability between the NAS level, product and operational baselines, and ensure consistent application of the CM discipline throughout the FAA. Its functions are to manage the CM process for the Agency; develop/issue policy and standardize CM processes and procedures; monitor, evaluate, report, provide corrective guidance, and follow-up to ensure CM is meeting Agency needs; serve as focal point for resolution of CM issues; and provide continuous improvement of CM for the Agency.

Table 2.2-1: NAS Infrastructure CM

Activity	ACM CM Resources	Non-ACM CM Resources
Plan and Manage CM Activities • Plan/Coordinate Agency CM Activities • Report Agency CM Status • Execute ACM Outreach • Perform Product Integration and Quality Control	ACM	[3]CMCT [4]CMSG

[3] CMCT Representatives (as of 06/99) ACM-220, AML-30, AND-400, ANI-5, ANS-110, AOP-1000, ARS, AUA-200

[4] CMSG Representatives (per CMSG Charter)- ACM-200, ANS-1,AOP-1,ARN-1,ARU-1,ATP-1, ARX-1,AOS-1,AML-1,ANI-1,AOZ-1,AND-300,AND-400,AND-500,AND-700,AUA-200, AUA-300,AUA-400,AUA-600,ASD-100,AIT-5,AXX-470,AAR-600,AIR-500,ACT-200,ACT-300

Activity	ACM CM Resources	Non-ACM CM Resources
Maintain CM Infrastructure • Maintain Policy, Process and Procedures • Maintain Links to External Processes and Products • Maintain MCI • Operate Control Desk • Provide CCB Support • Operate DCC	ACM	
Operate ACM Information Systems • DOCCON Support • Maintain Website • Monitor Related Initiatives • Manage CM Information Architecture	ACM	
Perform Monitor and Oversight Activities • Assess Agency Needs (Education, Problem Areas, etc.) • Implement Process Improvement Findings • Plan, Manage and Execute Agency CM Training	ACM	

3 Enhancement CM Activities

This section addresses the CM initiatives, which when completed will create an effective CM culture, thus facilitating the achievement of the FAA CM vision.

3.1 Establish and Operate a Strong CM Organization Reporting to ATS and ARA

Current Challenges (i.e., why is this enhancement activity necessary)

- Lack understanding of CM and its benefits at the management and practitioner level
- Need Standardized Responsibilities

Key Products and Measurable Outcomes (i.e., what will it look like when its fixed)

- Cross-functional Agency Direction (via CMSG approved CMPP)
- Life-cycle Approach to Issue Resolution and Product Integration (via CMCT and Workgroups)
- Quarterly Reviews of Agency CM to ATS/ARA

Table 3.1-1: Establish a Strong CM Organization Reporting to ATS and ARA Tasks

Start	Target Complete	Task Description	Participants
05/14/99	Complete	Obtain ATS/ARA-1 Concurrence on Organizational Action Plan	ACM
05/17/99	Complete	Develop Functional Statements	ACM
05/17/99	Complete	Develop Human Resources (e.g., Performance Plans, Cost Center Codes, etc.)	ACM
06/02/99	Complete	• Develop Operating Agreements/ Procedures • Review and Sign Operating Agreements/Procedures	ACM ARA, ACM,ATS

3.2 Perform Consistent and Balanced Application of Process and Policy

Current Challenges (i.e., why is this enhancement activity necessary)

- Lack of Integrity of All Baselines
- Lack of a Single Process for Life Cycle CM
- Need to Streamline and Simplify the Change Management Process
- Lack of Planning for CM During the Operational Phase
- Lack of Definition of Relationship between CM Process and Related Processes (i.e., JRC, Logistics, 2nd Level Ops, etc.)
- Need Standardized Roles and Responsibilities

Key Products and Measurable Outcomes (i.e., what will it look like when its fixed)

- Life Cycle Policy and Process (Completed)
- National Procedures (for Implementation of Policy and Process)
- CM Procurement Replacement Guidance and Standard CM Templates (RD, SOW, CM CDRLs, CM Plans, Audit Plans)
- Standard Monitoring Criteria to Oversee Contractor Configuration Identification
- Strategy for Configuration Management of Technical Interfaces
- CM Metrics Strategy
- CM Effectiveness and Quality Measures Action Plan
- Action Plan for recovering "Y2K (and Post Y2K) Authorized Updates" impacting NAS B/Ls

3.2.1 Develop National Procedures

Overview
This section addresses the work that must be completed to develop a CM infrastructure which undergirds the consistent and balanced application of process and policy. Whereas the foundation of this infrastructure has been completed (i.e., the development of a single life cycle CM policy and "top level" process), this section focuses on the work associated with the development of the National CM procedures which provide agency instruction on the following:

- Plan and Manage CM
- Configuration Identification
- Change Management
- Configuration Status Accounting
- Verification and Audits

To implement the National Procedures in the most efficient and effective manner, each procedure will go through the CMSG endorsed approval process:

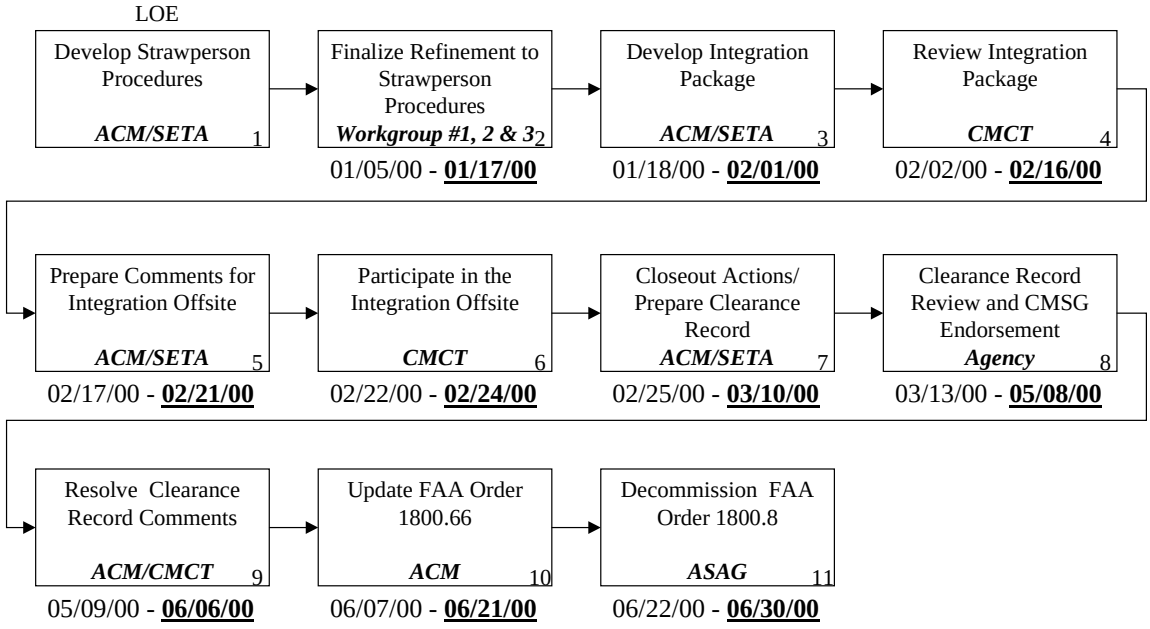


Table 3.2.1: Develop National Procedure Tasks

Start	Target Complete	Task Description	[5]Participants
02/01/99	06/06/99	Develop and Coordinate the Release of National Procedures	ACM
09/23/99	02/01/00	Subject Matter Expert Review	Workgroups 1,2,3, CMCT,CMSG
02/02/00	02/24/00	Integration Activities	CMCT
02/25/00	03/12/00	CMSG Endorsement	CMSG
03/13/00	06/06/00	Clearance Record Review and Comment Resolution	Agency, CMCT, ACM
06/07/00	06/30/00	FAA Order Clean-up	ACM, ASAG

[5] Workgroup Members are identified in Appendix B, WBS elements 116, 122, and 124

3.2.2 Implement Known Process Improvements

Overview
There are a number of activities underway to address known deficiencies in the current CM system. These initiatives will be integrated into the National Procedures upon completion. The initiatives include:

- Updating the NAS Change Proposal (NCP) Form
- Providing standard CM templates
- Supporting the Modification Tracking Initiative
- Identifying measures and metrics
- New Requirements Process
- Clarifying relation of NAS CCB and JRC
- Review current operations for continued process improvement

Table 3.2.2: Implement Process Improvements Tasks

Start	Target Complete	Task Description	Participants
12/06/99	01/19/00	Develop Standard CM Templates (including but not limited to) • FRD • SOW • CM CDRLs • CM Plan • Audit Plans	ACM, AUA, AND
01/20/00	02/18/00	Review Standard CM Templates	CMCT, AML, ANS, AMA, Regions (3)
06/13/00	09/25/00	Develop Standard Monitoring Criteria to Oversee Contractor Configuration Identification • Part, revision and version numbers • Serial and lot numbers • Marking and labeling of items • Embedded identifiers in source, object, and firmware code • Superceding parts (non-interchangeable conditions) • Documentation and engineering release systems	AOP, ACM, AML, AND, AUA, AOS, ANS
07/26/99	10/29/99	Develop CM Link to Modification Tracking Program.	Mod Tracking Work Group CM Participants
11/01/99	12/03/99	Assess the Impact and Develop Plans to Recover from “Y2K (and Post Y2K) Authorized Updates” to NAS Baselines	AML,AND,ANS, AOP,AOS,ACM, AUA, Regions (3)

Start	Target Complete	Task Description	Participants
01/03/00	12/29/00	Develop Strategy for Configuration Management of Technical Interfaces • NAS Interfaces, Technical Architecture, and JRC Decisions • Interface Control Documentation • Interface Control Working Groups • Requirements Traceability	AOP, ACM, ANS, AML, AND, AUA, Regions (3), AOS, ARS
05/23/00	08/14/00	Develop CM Effectiveness and Quality Measures Criteria	CMCT
05/02/00	08/07/00	Identify CM metrics	ANS, AOS, AOP, ANI, AUA, AND, AML, ARS, ACM, Regions (3)
01/03/00	12/31/01	Assess Measures and Initiate Corrective Action Plans	CMCT

3.3 Develop Skilled Workforce and Technology to Effectively Perform CM

Current Challenges (i.e., why is this enhancement activity necessary)
- Need Responsible Experts
- Need Complete and Integrated Information Source
- Need On-line Access to Information
- Status Accounting Information Doesn't Support Organizational Needs
- CM Tools are being Developed (Procured) Without Assessing Agency Impacts

Key Products and Measurable Outcomes (i.e., what will it look like when its fixed)
- Training Plan and Executable Modules (Based on Agency Requirements Survey)
- CM Information Architecture Concept of Operations
- Workflow Design Documentation, including the NCP Workflow, Data Design and Functional Design Documents
- Cradle-to-Grave Automated NCP Tool (Process Improvements Based on Pilot Operations)
- CM Document Strategy
- CM Corporate Web Page (Revision 1)
- CM Business Model
- Data Architecture
- Applications Architecture
- Technical Architecture

3.3.1 Develop Skilled Workforce

Overview

Developing a skilled workforce addresses the educational needs of CM stakeholders and is integrated with other agency initiatives. Integrated Product Teams (IPTs) and Regional personnel benefit from this program because it supports an agency-wide understanding of NAS guidance, best practices, lessons learned, current processes, and technology solutions for configuration management.

This effort targets executives, management, CM practitioners and general users. It consists of both formal and informal methods. Formal training includes the development and implementation of training modules or communication vehicles such as briefing materials. Commercial or government sources may be utilized to develop and conduct formal training. Informal training is accomplished through newsletters,

teleconferences, WEB based information and CM migration assistance. This effort includes use of the CM web site maintained by ACM.

There are three levels of workforce training: (1) CM Awareness (Understanding), and (2) Basic CM (Comprehension), and Advanced CM (Applied Knowledge), defined as follows:

(1) CM Awareness (Understanding) Provides an overview of the basic philosophy and practices which comprise the life cycle CM process. Focuses on the mission, goals, and objectives of CM along with the policy and procedures for implementation. Discusses how to use CM as a tool to accomplish organizational objectives. Discusses the value of CM and the appropriate use and interpretation of measurement. Geared to managers, general users, CM practitioners.

(2) Basic CM (Comprehension) Covers basic principles (configuration identification, configuration control, status accounting, CM planning, verification and audits, and data management) and best practices of CM process as outlined in FAA Policy, guidelines, and commercial practices. Geared toward CM practitioners and general uses, CM managers. ·

(3) Advanced (Applied Knowledge) Provides detail on the basic principles of CM for on-the-job application. Hands-on practice for writing CM plans, performing audits, and identifying configuration items etc. Geared toward CM practitioners.

Table 3.3.1: Develop Skilled Workforce Tasks

Start	Target Complete	Task Description	Participants
01/15/99	12/31/01	Develop/Conduct CM Awareness Briefings	ACM
01/15/99	12/31/01	Develop/Conduct Basic CM Courses	ACM
07/07/99	08/04/99	Develop Minimum Training Requirements	ACM,ANS,AOS, AOP, AND, AUA, 2 Regions
08/06/99	12/31/99	Develop Agency CM Training Program Plan	ACM
01/03/00	12/31/01	Implement Agency CM Training Program	ACM
1/6/00	12/26/01	Develop/Conduct Advanced CM Training	ACM, CMCT
	Ongoing	Attend applicable CM Training	Agency

3.3.2 Develop Technology to Effectively Perform CM

Overview
Over the next three years, the FAA will establish and maintain a standards-based information architecture. The underlying strategy will be to "design a little, build a little." That is, the CM Information Architecture will be incrementally designed, built, and implemented in a modular fashion. The Architecture's components shall relate to the CM business functions, as defined in the FAA CM life-cycle process model, the FAA CM Policy and CM procedures.

Each architecture module will address all of the four major CM information architecture components, including an enterprise business model, data architecture, applications architecture and technology architecture.

- ***Enterprise Business Model***. Identifies the functions of the CM business. Building on the National Procedure activities discussed in 3.2.1, to support further information modeling and analysis, that high-level process flow will be further decomposed to facilitate the documentation/analysis of information flows and the development of data models. Over time, the collection of workflow modules and the Life Cycle CM Process Diagram will form the FAA's CM Enterprise Business Model.

- ***Data Architecture***. The CM data architecture will identify and define the major kinds of data that support the CM business functions documented in the Enterprise Business Model. The data architecture will consist of data entities, each of which has attributes and relationships with other data entities. This information will be published in a corporate CM data dictionary, which will serve as a critical information source for agency information system designers. It will define a core set of corporate CM data that will be maintained consistently in agency CM databases and systems to ensure data sharing across databases and systems. In addition, a concept of operations will be developed and initiatives defined to improve CM document management in the agency. Issues such as the future role of the Document Control Center (DCC) and Program Support Libraries (PSLs), standard Contractor Deliverables and others will be addressed.

- ***Applications Architecture***. The CM applications architecture will define the major kinds of system applications needed to manage CM data and support life cycle CM activities. This architecture defines what applications will do to manage data and provides information to CM stakeholders. Further analysis will be conducted to define/refine current applications, design/build new applications and design/build interfaces between applications to facilitate data access, processing and sharing.

  As the Enterprise Business Model evolves, opportunities to leverage information systems and technology will be considered. Examples will include the tailoring of the automated tool (e.g., special input and output screens), metrics collection, status reporting and other applications. Data requirements from other supporting systems will be defined in detail, supporting the design of needed interfaces with the Modification Tracking activities lead by AOP, the Asset Supply Chain Management (ASCM) system now in the early requirements phase, and the NAS Architecture database, and others as appropriate.

- ***Technology Architecture***. The CM technology architecture defines the major kinds of technologies or platforms needed to provide an environment for CM applications that are managing data in a shared environment. The CM technology architecture will also leverage the existing FAA installed technology base, and approved FAA desktop and other systems standards where applicable.

In 1999, the emphasis of the CM Information technology has been to:

- ***Develop a strategy for incrementally designing and establishing the CM Information Architecture***. The CM Information Architecture Concept of Operations and Design Strategy will define the strategic direction and desired future FAA CM information management environment. It will document the "as-is" CM information environment, define the vision, goals, objectives, link documented requirements to ongoing initiatives and provide a base context to meet corporate CM information needs.

- ***Plan for and implement an automated tool pilot***. The Enterprise Document Management System (EDMS-CM) will be established to streamline the NCP process while maintaining process integrity, information reliability and sound configuration management principles. In planning for and implementing the tool pilot, a workflow/business model, data design document, functional (i.e., application) design document and technology plan (i.e., PC, network connections, etc.) will be developed to facilitate vendor programming, tailoring and deployment of the NCP processing application. These products will provide the initial framework/methodology for future CM Information Architecture products (i.e., Enterprise Business Model, Data Architecture, Applications Architecture and Technology Architecture).

- ***Enhance the CM Corporate Web Page.*** The CM web page will be restructured to improve information dissemination, prepare for automated tool interface and position the CM organization to leverage related web activities throughout the FAA. The CM Web Page is a vital component of the target technology architecture.

- ***Document management strategy***. A CM document management corporate strategy will be developed that defines roles, responsibilities, desired outcomes and a vision of the future. The goal is to define and then establish a corporate, distributed infrastructure to ensure that CM documentation is properly maintained and that needed access is provided to CM stakeholders in a timely, cost effective manner.

- ***Ensure Integration with related FAA information management initiatives***. Participate in and contribute to related agency initiatives to ensure that CM information requirements are addressed (i.e., facilitate integration with ACM-sponsored efforts), promote CM information management best practices and continue to contribute to the development of a corporate CM data dictionary and implementation of CM data standards.

In 2000, Information Architecture work will expand to other CM functional areas, beginning with Configuration Identification and Status Accounting to support DOCCON replacement. Work on the Architecture will continue through 2000 with a first draft of all CM Information Architecture components by December 2000.

Table 3.3.2: Develop Technology Tasks

Start	Target Complete	Task Description	Participants
05/03/99	11/30/99	Develop the Draft CM Information Architecture (IA) Concept of Operations and Design Strategy (CONOPS) Provide Input/Review CM IA CONOPs	ACM AOS,ANI,AML, AOP
04/01/99	09/30/99	Develop NCP Workflow, Data Design, and Functional Design documentation. Provide Input/Review Workflow Documentation	ACM AND,AUA,ANS, AOS,ASW,AGL, AML,ACT,AOP
09/01/98	12/31/99	Conduct procurement activities to Acquire EDMS(CM) Automated Tool.	ACM, ANS, ANI, AML, AOP
01/03/00	03/03/00	Design, Develop and Implement EDMS(CM) NCP Flow Application and Supporting Technical Infrastructure	ACM
03/06/00	09/25/00	Manage Operation of the EDMS CM Tool Pilot for NCP processing Operate and evaluate EDMS CM Tool Pilot for NCP processing	ACM AND,AUA,ANS, AOS,ASW,AGL, AML,ACT,AOP
05/03/99	10/29/99	Develop Document Management Strategy/Concept of Operations	ACM
11/01/99	12/31/99	Define Automated Linkages between Mod Tracking System and CCDs	ACM
05/03/99	12/28/01	Monitor ASCM evolution for impacts to CM	ACM
05/03/99	07/01/99	Redesign CM Corporate Web Page	ACM
01/03/00	12/29/00	Develop/Implement Business Model (Rev. 1) • Data Architecture • Applications Architecture • Technical Architecture	ACM

Start	Target Complete	Task Description	Participants
01/03/00	12/29/00	Build/Implement Revision 1 of the Data, Applications and Technical Architectures	ACM
01/03/01	12/31/01	Develop/Implement Business Model (Rev. 2) • Data Architecture • Applications Architecture • Technical Architecture	ACM
01/03/01	12/31/01	Build/Implement Revision 2 of the Data, Applications and Technical Architectures	ACM

3.4 Obtain Commitment from Associates and All Levels of the Organization

Current Challenges (i.e., why is this enhancement activity necessary)
- Lack understanding of CM and its benefits at the Management and Practitioner Level
- Lack of Resources and Budget for CM
- Need Responsible Experts

Key Products and Measurable Outcomes (i.e., what will it look like when its fixed)
- CM Management Procedures (including Monitoring, Oversight and Evaluation)
- Performance Plan Criteria
- Evidence of the Inclusion of CM in Performance Plans (CMSG Members, SMO/Regional Manager Level, etc.)
- CM Cost Factor for Cost Estimating Under Investment Analysis
- Life Cycle CM Position Descriptions

Overview
The activities associated with obtaining commitment from the associates and all levels of the organization is an ongoing activity; however, this plan will focus on establishing the criteria and measures to assess FAA commitment to CM. The work is focused in three primary areas:
- (Day-to-Day) Management Procedures for the integrity of the CM process
- Resource Analysis and Modeling
- Commitment Measures

Table 3.4: Obtain Commitment Tasks

Start	Target Complete	Task Description	Participants
01/03/00	03/31/00	Develop CM Input for Use With Performance Plans	ACM, AND, AUA,ACT, AML, AOS,ANS,AOP, Regions (3)
01/01/00	12/31/00	Perform Resource Assessments • Develop CM Factor for Investment Analysis • Develop CM Position Descriptions • Develop Activity Based Estimates and Criteria	ACM, AND, AUA,ACT, AML, AOS,ANS,AOP, Regions (3)

4 Resources and Risks

The resources required to complete ***the enhancement*** activities described in section 3 (along with CMCT and CMSG support) are listed in Table 4.1-1 – these numbers **DO NOT** represent FAA day-to-day CM activities. These numbers do not include the work associated with supporting the NCP Tool Pilot, as this effort is a part of performing day-to-day change management and status accounting.

Table 4.1-1 Resources Required to Enhance CM

Organization	CMSG FTE[6]			CMCT FTE[6]			Practitioner FTE[6]		
	1999	2000	2001	1999	2000	2001	1999	2000	2001
AAR	37.6	20.8	20.8						
ACM	37.6	20.8	20.8	2553	3157	3216	16911	15114	11401
ACT-200	37.6	20.8	20.8						
ACT-300	37.6	20.8	20.8						
ACT-400	37.6	20.8	20.8				77	184	42
AIR-500	37.6	20.8	20.8						
AIO-2	37.6	20.8	20.8						
AML	37.6	20.8	20.8	135	270	188	132	350	42
[7]AND (300,400,500, 700)	37.6	20.8	20.8	159	302	188	141	364	42
ANI	37.6	20.8	20.8	135	270	188	86	32	
ANS	37.6	20.8	20.8	135	270	187	119	320	42
AOP-1000	37.6	20.8	20.8	136	281	188	163	358	42
AOS-200(AOS-1 for CMSG)	37.6	20.8	20.8				220	373	42
AOS-500				135	270	188	172	342	42
AOZ-1	37.6	20.8	20.8						
ARN-1	37.6	20.8	20.8						
ARS				135	270	187	24	136	
ARU-1	37.6	20.8	20.8						
ARX-1	37.6	20.8	20.8						
ASD-100	37.6	20.8	20.8				24	132	
ATP-1	37.6	20.8	20.8						
[8]AUA (200,300,400,600)	37.6	20.8	20.8	160	285	188	160	343	42
Regions	37.6	20.8	20.8				341	842	125

Specific resources per task are detailed in the Appendices.

A key risk to completing these tasks is the availability of the resources presented above. Additional risks to the success of this plan are:

- ***Culture***
  - Ability of FAA to respond to an organization with dual accountable
- Working group members may not be able to shed organizational biases and think globally.
  - Management and CM Stakeholder Commitment
  - Unionization of employees
- ***Procedural***
  - Legal/Contractual/Procedural barriers associated with implementing procurement standards

[6] Based on the number of hours/year per organization (1 year = 2080 hours)
[7] CMSG numbers apply to each AND division; CMCT and Practitioner numbers are spread across organization
[8] CMSG numbers apply to each AUA division; CMCT and Practitioner numbers are spread across organization

  - The production of National Procedures in parallel (rather than in series) has a potential to make all disjointed and fragmented
  - Lack of FAA methodology to resolve (and accept resolution) of process, policy, and procedures which conflict with existing FAA orders
- ***Technology***
  - Continuing to spend funds on technology without an agency perspective (i.e., paying for duplicative capabilities, etc.)
  - Not having an automated CM Tool that the FAA would use
  - The implementation of an appropriate CM Tool (or Tools)
- ***Cost***
  - Additional costs associated with developing and implementing procedures and guidance may not be fully appreciated as there is no current way to quantify the cost of not implementing
  - Moving to a standard identification system may impose extensive costs on replacing existing identification systems
  - Funding for contractor provided training

Acronym List

AF - Airways Facilities
AMS - Acquisition Management System
ASAG - Acquisition System Advisory Group
ASCM - Asset Supply Chain Management
ATC - Air Traffic Control
B/Ls - Baselines
CCB - Configuration Control Board
CCD - Configuration Control Decision
CDRL - Contract Data Requirements List
CI - Configuration Item
CM - Configuration Management
CMCT - Configuration Management Core Team
CMIM - Configuration Management Information Management
CMPP - Configuration Management Program Plan
CMSG - Configuration Management Steering Group
CONOPs - Concept of Operations
CSA - Configuration Status Accounting
DCC - Document Control Center
DOCCON - Document and Configuration Identification System
EDMS - Enterprise Document Management System
EEM - Electronic Equipment Modification
FAA - Federal Aviation Administration
FCA - Functional Configuration Audit
FRD - Final Requirements Document
IA - Information Architecture
iCMM - Integrated Capability Maturity Model
IOU - I Owe You
iPG - Integrated Process Group
IPP - Integrated Program Plan
IPT - Integrated Product Team
JRC - Joint Resources Council
LOB - Line of Business
MCI - Master Configuration Index
NAS - National Airspace System
NCP - NAS Change Proposal
OPI - Office of Primary Interest
PC - Personal Computer
PCA - Physical Configuration Audit
PSF CCB- Power Systems and Facility CCB
PSL - Product Support Library
RD - Requirements Document
Rev. - Revision
SETA - System Engineering and Technical Assistance
SME - Subject Matter Expert
SMO - System Management Office
SOW - Statement of Work
SPB - Site Program Bulletin
TIPT - Telecommunications IPT
WBS - Work Breakdown Structure
Wkgrp - Workgroup
Y2K - Year 2000